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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •

JANUARY 20, 1934

Daughter of Eskimo Chief Lies Here

See Page 44

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The Weekly Summary of Current Science

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Edited by WATSON DAVIS

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DO YOU KNOW?

The banana "tree" is really an herb.

Approximately 400 square miles of the floor of Death Valley lies below sea level.

There are at least 525 cities in the world with 100,000 or more people, and nine-tenths of them are in the Northern hemisphere.

Deaths from carbon monoxide gas are increasing out of all proportion to other forms of accidental death, warns the National Safety Council.

The cinchona tree which yields quinine is a native of South America, but today 97 per cent. of the world's supply comes from Java.

In ancient Babylonia, a money lender often required a borrower to give a "pledge" in the form of a slave or other property which the lender could use until the loan was repaid—a substitute for interest.

A map, apparently drawn by the daughter of Marco Polo, and showing the route of his famous Asiatic journeys, has come to light.

Government scientists discovered that in Swiss-cheese making there are three, possibly four, kinds of bacteria involved, each with a particular task.

Forty million, or more, young trees are to be planted on lands where erosion has washed off the rich top soil, according to conservation work plans.

Careless smokers have been blamed for starting more fires in the national parks than originate from other causes, but this year lightning was the most frequent fire cause.

A botanist says that modern housekeepers have less "luck" with house plants than grandma had because grandma knew more about plants and her house was better adapted to growing them.

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What kinds of proprietary medicines must according to the proposed Pure Food and Drug Bill carry their formulae on the label? p. 39. 100,000,000 *Guinea Pigs—Arthur Kallet and F J. Schlink—Vanguard*, 1933, $2.

SOCIOLOGY

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Who would restore the tribe to importance in Indian affairs? p. 40.

ZOOLOGY

Who put the mongoose in literature? p 47.

These curiosity-arousing questions show at a glance the wide field of scientific activity from which this week's news comes. Book references in italic type are not sources of information for the article, but are references for further reading. Books cited can be supplied by Book Department, Science News Letter, at publishers' prices, prepaid in the United States.

GENERAL SCIENCE

Research Receiving Trivial Portion of Recovery Funds

Only One Third of One Per Cent. of This Year's Ten Billion Cost of Government Being Spent For Scientific Research

JUST ABOUT one-third cent out of each dollar being spent by the United States Government during the present fiscal year ending on June 30 of this year goes for scientific research. This is less than 30 cents for each man, woman and child in the U. S. A., and about 30 cents out of each $100 Uncle Sam is spending this year.

The total cost of running the government this year will amount to nearly $10,000,000,000. The exact figures, as revealed in the stupendous volume on the U. S. Government's budget, recently submitted by President Roosevelt to Congress, amount to $9,403,006,967, of which $3,045,520,267 is for the general expenditures of the Government, and $6,357,486,700 for the emergency expenditures attendant upon the recovery program. Another $488,171,500 might be added to represent the public debt retirements, bringing the grand total up to the awesome sum of $9,891,171,500.

This money is being spent to prepare for war and to pay for past wars, to build roads and post offices, to insure bank accounts, and to make the farmer self-sustaining. But only a tiny slice of it, less than one-third of one per cent., goes for scientific research.

Even when allowance is made for money alloted from the public works and relief funds for work of benefit to science, the total expended for science and research is estimated to be only about $29,500,000. This is three tenths of one per cent. of the total general and emergency expenditures, not including the public debt retirements. It is less than 30 cents for each $100 if the public debt figures are considered in the grand total.

Or, if the emergency expenditures are left out of the picture, the Government's money invested in scientific research still amounts to less than one dollar to each hundred of the total general expenditures for the year.

It is interesting to compare the amount spent for science with the amount going for interest on the rapidly accumulating public debt. Uncle Sam's bill for interest for the next fiscal year will come to $824,349,000, an increase of $82,349,000 over the present year 1933-1934. This year's bill amounts to $742,000,000.

In other words, Uncle Sam spends only 3.58 cents for science for each $1 he pays out for (*Turn to Page* 46)

GENERAL SCIENCE

New Budget Only Slightly Reduces Scientific Funds

THE NEW Federal budget for the year 1934-35 just submitted to Congress by President Roosevelt does not propose any substantial slashes in funds for scientific bureaus below the funds that were available for use during the present fiscal year.

Of the funds appropriated by Congress last year for use during the fiscal year 1933-34, approximately $34,768,000 was for the support of scientific research. But this sum was greatly cut by the Budget Bureau after the beginning of the Roosevelt administration. Figures appearing in the new budget volume indicate that only about $28,893,000 was actually allowed the Bureaus for scientific work. A somewhat smaller amount for scientific research is allowed in the new 1934-35 budget for the fiscal year starting next July 1. Probably not more than $27,735,000 will be available for this purpose during the coming year.

Most of the bureaus affected, however, have just as much as they did during the present year, or a little more.

The Bureau of Standards is allowed $1,437,702 instead of $1,336,000. The Bureau of Mines gets $762,926 instead of $694,985. The Naval Observatory gets $169,994 instead of $160,025. And other scientific bureaus or offices are given sums similarly close to the figures apportioned to them this year.

The main exception is the Department of Agriculture. Although this Department is allowed under the budget greatly increased funds, these are mainly for administrative purposes and particularly for the carrying out of the recovery program. It is too early yet to know just what proportion of the total will be apportioned for research, but it is believed that not more than $15,700,000 will be devoted to this constructive work as against $18,000,000 available this year.

If Congress approves the budget as submitted, it will mean that scientific funds will be cut about 4 per cent. below the funds available for the present fiscal year, and 34.5 per cent. below the $42,375,000 spent on research during the fiscal year 1931-1932.

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PALEONTOLOGY

Triple-Sized Bison Lived In California Long Ago

THE SKULL and horns of a giant bison which roamed over the hills of northern California about a million years ago have been found in Shasta County, near the town of McArthur. The discovery was made on the Jim Day ranch.

The fossil remains are now the property of the University of California museum of paleontology, where they are being studied in the light of our knowledge of present day bison. Dr. C. L. Camp, director of the museum, states that the specimen is valuable, because it is one of the very few in existence today. These animals were rare on the North American continent. Previous traces of their existence have been found mostly in the Great Plains area, and in Alaska.

It is estimated that each horn sheath of the animal was about five and one-half feet in length, as each horn core is three and one-half feet long. The greatest distance between the curved horns was about six feet, and the horns themselves, measured from tip to tip, were about twelve and one-half feet. The skull measures about eighteen inches across. It is believed that this

prehistoric animal was about three times the size of the modern bison.

Its remains were uncovered by Burnett Day, a thirteen-year-old youth, who in attempting to pick up a rock to throw at some sheep, grabbed hold of what proved to be the tip of the bison's horn, which protruded a few inches above the ground.

The giant bison, Dr. Camp says, belonged to the great "climax" animals of the Pleistocene geologic period. It was contemporary to the saber-toothed tiger, the ground sloth, the Columbian elephant, and others of huge bulk. They reached what scientists term the climax in development, and then suddenly and mysteriously disappeared from the earth.

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ENTOMOLOGY

Minute Duckweed Infested By Even Smaller Insects

THE TINY plants of duckweed, that form living blankets on stagnant ponds, are visited and inhabited by insects correspondingly tiny, Dr. Minnie Brink Scotland of the New York State College for Teachers, Albany, recently reported to the Entomological Society of America.

There are six dominant insect forms, including a bug, an aphid, a beetle and a fly. One caterpillar is bigger than the individual plants it uses, but by binding them together in a raft it makes them serve its purpose.

Science News Letter, January 20, 1934

CRIMINOLOGY

Racketeer File and Statistical Machines Aid Fight on Crime

SCIENCE and the most modern business methods are serving as powerful weapons in Uncle Sam's new drive on organized criminals, kidnapers and racketeers. One of the most useful of these new defenses is a newly organized file at the Identification Unit of the U. S. Department of Justice.

In the drawers of this file are the fingerprints of known gangsters, kidnapers and extortionists—each single fingerprint filed separately. The advantage of having each finger filed separately, instead of in sets of ten as in the regular identification files, is that the search for a single print picked up at the scene of the crime, or found on a ransom note, perhaps, is made much easier by this system.

Suppose one print is found on one side of a sheet of paper or a bottle, and on the other side are noticed four smudges. Officials receiving this print may assume first that it is a thumb. Right thumb prints are filed all together in this new single-print file; but not all are of the same pattern, and they are classified and filed by pattern, not by the criminal's name.

Perhaps the "latent" print found on the paper has what is known as a loop pattern. That narrows the search to the loop classification. The direction the loop points, whether toward the little finger or away from it, indicates still another sub-classification. The number of ridges in the loop limits the search still further. Finally, the particular section which must be searched for that type of print contains not more than about 25 cards. If not found there, the search would be continued among the left thumbs, and so on.

It is a comparatively simple task to search a bunch of 25 cards one by one until the "latent" print is identified. It would be a hopeless task to search the millions of prints in the regular files.

Sorting and Punch Cards

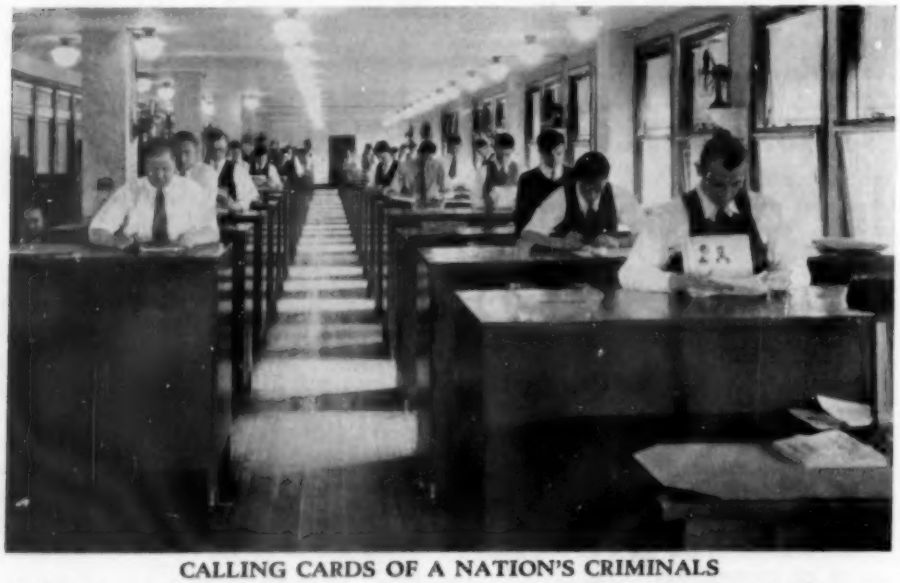
Statistical sorting machines and punch cards familiar in business have also been enlisted by the Federal Government's Department of Justice detectives.

As an auxiliary to the new single-print file of fingerprints of racketeers the Identification Unit is now keeping a detailed descriptive file of such criminals. Since names mean less than nothing among criminals, the index to this file is the description of the men. And this index is kept in a comparatively novel way. It is punched on the cards used in sorting machines for statistical work. A hole in one location means blue eyes, in another brown eyes, and so on. Height, weight, age, sex, scars, deformities, and peculiarities of speaking are some of the items recorded on this punch card.

Contact Man Usual

A fortunate aspect of some crimes, including kidnaping, is that there is usually some contact with at least one member of the gang, either at the time of the abduction, when the ransom is paid, or at some time during the negotiations. If a clear description of the person is sent immediately to the Department of Justice, within a few minutes the punch cards can be run through the sorting machine and all known offenders answering to that description selected.

The file records, including photographs and record of offenses, can then be shown to the person who has seen the criminal for positive identification.



CALLING CARDS OF A NATION'S CRIMINALS

Information and fingerprints concerning thousands of criminals are kept in this regular file of fingerprints of the U. S. Identification Unit. When an arrest is made or a suspect picked up, his fingerprints are rushed to Washington, where a few minutes' search in this file will reveal his past record.

The kidnaper's curt demand for payment often becomes a boomerang leading the detectives directly back to him.

For the ransom note is an important clue in the solution of such crimes. It may be that fingerprints can be brought out by special treatment of the paper. Examination under a microscope often reveals defects of paper or watermark through which the paper can be traced to the locality where it was purchased by the extortioner. The microscope may also reveal stains or particles of dust, the nature of which may indicate something of the letter's history.

Handwriting Reveals

And even though the letter is unsigned, the expert can find clues to identity in the handwriting itself. Although Uncle Sam's handwriting experts do not rely on the idea that personality is revealed by handwriting, they do know from experience that much can be learned about the individual from this source.

Nationality is one of the facts revealed by handwriting. The German, the Austrian, and the Italian are betrayed by tiny peculiarities in the formation of letters, which would be unnoticeable to you, but which are noted immediately by the expert's keen eye and microscope.

Age is another item which can be estimated by the expert examining handwriting.

Diseases sometimes show up in handwriting, especially nervous diseases. And if the note is written on the typewriter, the extortioner is but little better off. No two typewriters produce exactly the same writing, and the expert has learned to trace machines with uncanny accuracy.

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▼ RADIO ▲

WHAT X-RAYS CAN TELL US ABOUT ATOMS

an address by

Prof. S. K. Allison

of the Ryerson Physical Laboratory, University of Chicago

Wednesday, January 24, at 4:30 p. m., Eastern Standard Time, over Stations of the Columbia Broadcasting System. Each week a prominent scientist speaks over the Columbia System under the auspices of Science Service.

PSYCHOLOGY

Steadiness Tests May Pick Marksmen Before They Shoot

Likelihood of Advance Choice Indicated by Tests in Which Expert Riflemen Excel Others in Muscular Coordination

EXPERT riflemen of the University of Oregon R.O.T.C. unit greatly excelled all other students examined in a series of muscular coordination tests given at Eugene, Ore., recently, and so positive were the results that University psychologists see in the experiment a new and efficient method of selecting men for expert marksmen, it was announced by Dr. Robert H. Seashore, associate professor of psychology, and Raymond D. Adams, his assistant.

The results showed that but one person out of sixty examined equalled the record made by members of the rifle team in a series of five tests. Musicians, draftsmen and athletes, as well as a number of men selected at random, made up the group. Additional experiments carried out with the riflemen indicate that the actual training in rifle shooting itself was not the major factor in accounting for the superiority shown by team members. Intensive practice in the tests themselves, carried on over a period ten times as long as the standard time, produced an amount of improvement which would account for only one-fifth of the total range of individual difference.

The university scientists now plan, as a crucial test, to select from men wholly untrained in rifle shooting one group showing superiority in these tests and another showing average ability. Both groups will then be given the same training in marksmanship. If the selected group shows a marked superiority in actual rifle fire, it is believed that a standard test can be devised that will eliminate the costly practice methods now used to select men for training. Savings in ammunition by armies, military schools and other organizations would be tremendous.

The five tests given included the Miles ataxiameter for measuring postural sway, the Beal and Hall ataxiagraph for photographing tremor movements of the arm, a steadiness test apparatus devised by the University men for measuring accuracy in thrusting and in arm steadiness, and a fifth test that records the actual sway of the rifle in shooting position.

A common factor of steadiness, quite unexpected, was found in the tests. Most motor tests, such as those for speed, are unrelated, the scientists pointed out. The rifle team and athletes were superior to the unselected group in every test, while draftsmen and pianists were superior in all but the ataxiagraph test.

Dr. Seashore is well known in psychological research fields for his previous work on motor coordination. Testing apparatus he has devised is now widely used in psychological laboratories.

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PLANT PATHOLOGY

Virus of Plant Mosaic Concentrated in Protoplasm

EVIDENCE that the invisible, filter-passing virus that causes mosaic disease in tobacco is concentrated in the living protoplasm of the cells, and not in the watery contents, or cell sap, has been obtained by Prof. B. M. Duggar and Dr. L. G. Livingston of the University of Wisconsin.

They used a special apparatus with microscopically slender hollow points, to penetrate certain large hair-cells on the surface of tobacco leaves and extract various parts of their contents—an almost incredibly delicate operation. The virus seemed not only to be concentrated in the protoplasm, but to be especially strong when the cells contained special structures known as "inclusion bodies," which can often be demonstrated when the disease is present in the plants.

"It is suggested," said Prof. Duggar, "that the inclusion bodies at least accompany the development of the virus agency in high concentration. Clear demonstration was obtained that the inclusions are fragile structures, readily breaking into granules when touched with the micropipette."

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PUBLIC HEALTH

Diphtheria Still Unconquered, Even Shows Local Increases

IN THE GENERAL rejoicing over the decrease in deaths from diphtheria some of the facts in the situation seem to have been overlooked. The disease is far from being conquered in spite of the fact that a means of wiping out the disease is at hand and that great progress toward that end has been achieved in some localities.

It is something of a shock to learn from the statisticians of the Metropolitan Life Insurance Company that "there are still a number of states and cities where the diphtheria mortality is today not only atrociously high, but is actually increasing."

Their figures show that in 1932 four states registered more than 13 deaths from diphtheria per 100,000 population. In every one of these states, the diphtheria death rate was much higher than that recorded two years previously.

"A summing up of the distinctly unfavorable aspects of the diphtheria situation shows that there were 18 states which recorded, in 1932, diphtheria death rates in excess of the average for the United States in that year," the report states.

"In 12 of these states the situation is getting worse instead of better, as is shown by comparison of their 1932 death rates with those recorded two years earlier. Furthermore, in 22 of the 32 large cities whose 1932 diphtheria mortality rates were above the average for the country, the 1932 figures were higher than those for 1930."

During the ten years from 1922 to 1932, the latest for which complete figures are available, the diphtheria death rate in the country at large was reduced nearly 70 per cent. But in Kentucky, West Virginia and Oklahoma the diphtheria death rate of 1932 was nearly as high as the average for the country ten years previously. In New Mexico, which had the highest diphtheria death rate in the country, the 1932 death rate from this disease was actually 34 per cent. higher than that of the United States as a whole ten years previously.

With the exception of New England, the Middle Atlantic and Pacific Coast States, at least one and usually several states of every other section of the country have diphtheria death rates that are high and still increasing.

There were 32 large cities in 1932 which had diphtheria mortality rates above the average for the country. The worst situation was in Knoxville, Tenn., where diphtheria killed 17 out of every 100,000 inhabitants. Following closely after were Dallas, Tex., Fort Worth, Tex., Peoria, Ill., Lowell, Mass., and Oklahoma City, Okla.

"It is difficult to understand how whole states and certain cities can justify their administration of the public health facilities to permit the continuance of high and increasing diphtheria rates at the very time when a marked reduction is going on in the country at large, and all over the civilized world," the insurance company statisticians observe. "Diphtheria would soon be banished altogether if immunization by toxin-antitoxin or toxoid were extended to include all susceptible children."

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GEOLOGY

Sun Symbols Shown To Be Petrified Puddles

REVERED as sacred symbols of the sun by Indians of the Southwest, peculiar pits in sandstones with radiating ridges running out from them have been shown to be the result of small pools of rainwater, repeatedly collecting and evaporating in the same places. They are literally petrified puddles.

Such is the interpretation placed upon these peculiar formations by Walter B. Lang of the U. S. Geological Survey. The history of a rainwater pool in the Southwest is likely to be different from that of a similar pool in more humid regions, Mr. Lang points out. Rainwater has an eroding and dissolving effect on sandstone and other rocks. Its dissolving action causes shallow basins to become broader and deeper.

But in an arid region the dissolving action is intermittent, simply because the water soon evaporates. Moreover, where slight irregularities are present around the rim of such a pool, they function in a more or less wick-like fashion, drawing up water by capillary attraction, the water bringing the mineral salts dissolved in it. This results in a concentration of these salts, and the formation of the radiating ridges. Thus the "sun symbols" are formed by the rain and the sun.

SUN-SYMBOL

Revered by Southwestern Indians, these rib-rayed depressions in porous rocks are now interpreted as results of repeated evaporations of rainwater pools.

There are a number of these peculiar "sun symbols" in the rocks of the Southwest that were given particular reverence by the Indians. One of them, perhaps the one most seen nowadays by white man, is at Mesa Verde National Park. Indians of ancient time surrounded this on three sides with a wall, leaving the fourth side open, thus forming a sort of open-air temple or shrine.

Earlier geologists interpreted this "sun symbol" first as a print of a petrified palm leaf, with ridges where the ribs used to be. Then this interpretation was set aside in favor of the idea that it was formed by a spring gushing up through a sandy basin in earlier geologic time, leaving ridges that subsequently were hardened into stone. But when Mr. Lang made a critical study of the distribution of minerals in a section through one of these "sun symbols" he found that it did not support the ancient spring hypothesis, which by actively stirring up the sand would have made for uniform distribution of the salts throughout the sandstone. Instead, the localized distribution of some of the minerals, and especially their concentration in the ridges, indicates that the rainwater pool explanation is closer to the truth.

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PUBLIC HEALTH

Conferences Leave Teeth In Pure Food and Drug Bill

Committees Provided to Balance Secretary's Power; Formulae Not Required on Labels of All Proprietaries

THE REVISED Copeland bill, the Pure Food and Drug Bill, Model 1934, emerges from the Senate conference somewhat changed from what it was like when Dr. Rexford Tugwell, assistant secretary of agriculture, first handed it to Senator Copeland for his foster-fatherly care. What some anxious statesmen and businessmen considered to be a too fiercely scowling aspect has been softened somewhat; yet its friends, after looking it over pretty carefully, are for the most part agreed that the operation did not remove any necessary vital organs, and that the infant may soon be well able to take over, and perform better, the task of guarding the health and pocketbooks of the nation that has been the job of the veteran Food and Drug Act of 1906 for nearly a generation.

The most outstanding change, perhaps, is the provision for two Presidentially-appointed committees, one on public health and one on foods, to advise the Secretary of Agriculture on regulatory measures which he may suggest as necessary. The scheme is a beautiful example of the traditional machinery of checks and balances so dear to the American political heart. The committees cannot initiate regulatory proposals; the Secretary does that. If they agree that a regulation is desirable in a given instance, they proceed to draft the measure. After notice and public hearing, the Secretary may then promulgate the regulation with the force of law—but only if at least three of the five members of the committee concerned vote affirmatively.

This set-up takes over the regulation-making activities contemplated in the original bill for the Secretary of Agriculture himself, without the checks-and-balances mechanism. Such broad powers delegated to the Secretary were looked upon with alarm by some business men, who now state that their fears are allayed.

The novel feature of the new legislation, the inclusion of cosmetics along with food and drugs as a proper field for governmental protection of the consumer, is not materially changed. The larger and stabler group of cosmeticians seem to be willing to purchase the elimination of fly-by-night, unethical skin-ruiners and hair-destroyers at the price of a bit of overseeing of their activities by federal officials.

The toughest, most controverted parts of the bill, now as in 1906, turned on the proprietary, or "patent medicine" question. Here the gentry whose practices are, to say the most charitable, "marginal" in their nature cluster thickest, and here the fight was hardest. Yet in the face of opposition that was often underhanded and extremely dirty in its tactics, the main provisions of the original bill have come through. The extension of truth-telling from labels to advertising is retained. Where a change was made, it was merely to substitute less formidable language without significant change in meaning.

The provision that formulae of all proprietary preparations must be printed on the label was stricken out, at the insistence of those who felt their "trade secrets" were being endangered; but in its place are listed a number of compounds which must be declared on the label. Among them are stimulant-depressants like alcohol, sedatives such as acetanilid, and cumulative poisons like mercury and arsenic. Provision is also made for requiring in appropriate circumstances label warnings against overdosages and other unsafe use. Preparations which are merely palliative must bear on their labels a plain statement of just how they act in the relief of the conditions they purport to palliate.

One change smacks a little of an attempt to muzzle the press, and for this reason may not be liked by editors. The original bill provided that when a case is filed in court against a manufacturer or distributor for violation of the law the Department of Agriculture would be authorized to give out a statement of the action. This provision has been deleted. Under the bill as now drawn such information may be had only from the court where the action is being tried —and such a court may be a long distance from Washington. Only after judgment has been rendered may the Secretary of Agriculture and his subordinates discuss the matter publicly. It is more or less analogous to a prohibition of the news mention by a district attorney of the indictment of a person accused of a misdemeanor or crime, except insofar as such news might be obtained from the court records themselves. Nobody seems to know just why this provision was inserted by the conferees.

A rival to the Copeland bill has been introduced in the House by Rep. Loring M. Black. It is sponsored by the National Drug Trade Conference, which includes a number of associations of manufacturers of both pharmaceutical and proprietary preparations, wholesale and retail druggists, etc. Its provisions are in general much less stringent than those of either the original Tugwell bill or the present Copeland bill as offered in the Senate.

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PUBLIC HEALTH

Health Work Supported In Spite of Depression

IN SPITE of hard times and depression, states, counties and towns are continuing to support public health activities, the Commonwealth Fund has found. Child guidance clinics also have, in general, weathered difficulties due to budget reductions.

Nearly half of the Fund's appropriations for the past year went into public health work of various types, according to the annual report published in New York recently. This included rural public health service, rural hospital service, medical education and medical research, and mental hygiene projects.

In assisting the states of Tennessee, Mississippi and Massachusetts to improve public health and medical conditions, the Fund found the health departments of these states giving continued support to the joint program in spite of severe budget reductions. In Fargo, N. D., the child health demonstration financed by the Fund seems to have had lasting results.

The Fund's support was withdrawn five years ago, but the health department has continued to function effectively.

Science News Letter, January 20, 1934

ARCHAEOLOGY

Rescue of Mounds Begins In Tennessee Valley

WITH the arrival in Knoxville, Tenn., of Prof. W. S. Webb, of the University of Kentucky, active work in rescuing Indian remains in Norris and Wheeler Dam zones of the Tennessee Valley Authority has been started.

Prof. Webb will survey the region, in the effort to locate important Indian mounds and village sites. Road building and grading crews, and other construction workers, will assist him by reporting when steam shovels or spades turn up any bones, pottery or other remains that seem significant in America's ancient history. Material thus located will be left untouched until Prof. Webb can reach the site.

The data that Prof. Webb can salvage will be important contributions to American archaeology. So much of the land will be flooded or torn up by excavations, that this is considered the last chance to check up on the past history of this part of America.

Prof. Webb has been given leave from his university for a year. The CWA is financing Prof. Webb's salary. Responsibility for other expenses is assumed by the National Research Council.

Science News Letter, January 20, 1934

SOCIOLOGY

Indian Lands May Be Returned to Tribes

WHAT action should be urged upon Congress for the benefit of American Indians was discussed at a conference in Washington.

The conference called together representatives of the Indian Rights Association, the National Association on Indian Affairs, the Indian Civil Rights Committee, the American Indian Defense Association, the General Federation of Women's Clubs, and other interested groups. Commissioner of Indian Affairs John Collier attended.

Commissioner Collier, who was formerly executive secretary of the American Indian Defense Association, and intensely eager to improve the Indians' lot, has already put into effect some of the reforms which his association advocates. But legislation is needed for basic changes.

Most vigorously advocated of all the proposed changes, probably, is an improvement in the Indian land law. The law of 1887, which allotted lands to individual Indians, has resulted in a net loss to the Indians of two-thirds of their land in less than 50 years. Whole tribes have become pauperized, Mr. Collier declares. A return to tribal ownership of land is the legislative solution now approved by the Indian Office.

Land, without money for buying seed, farm animals, and equipment, is not likely to set destitute Indians on their feet economically. Hence, a system of financial credit for the Indians is also being stressed.

Another piece of proposed legislation would permit incorporation of Indian tribes. The Indian Commissioner favors for the Indians self-government in the tribal pattern familiar to the Indians. Legally-recognized tribal councils are also recommended, to insure authority to the tribal officials.

Science News Letter, January 20, 1934

BACTERIOLOGY

New Method Cuts Time Of Estimating Bacteria

A SHORT cut for estimating the number of living bacteria growing in a tube of artificial media has been developed by two government scientists, Drs. W. C. Frazier and A. J. Boyer of the U. S. Department of Agriculture.

The old method of doing this consisted of inoculating a bit of the culture in the tube onto a plate of solid growth medium and watching for the development of colonies of bacteria. This took from two to four days.

The new method, recently reported to the Society of American Bacteriologists, takes less than an hour. Its accuracy has been proved by checking with the old method.

It consists in smearing a measured amount of a proper dilution from the bacterial culture in the tube on a measured area of a glass slide. This is allowed to dry in the air and is then "fixed" by holding it over boiling water for five minutes. The slide is next placed in sterilized filtrate from a culture of *Streptococcus lactis* for half an hour at a fairly high temperature (70 degrees Centigrade), then stained and examined under the microscope. The treatment with the filtrate changes the way in which the dead bacteria react to certain stains and thus provides a means of estimating the numbers of living bacteria in the culture. (*See SNL, Dec. 30, '33, p. 421*)

Science News Letter, January 20, 1934

IN SCIENC

SOCIOLOGY

Ph.D. Helps Teachers Hold Jobs During Depression

WITH a Ph.D. degree and some experience, the prospective college teacher stands the best chance of getting a position and of keeping it when "retrenchment" programs go into force, Prof. James G. Umstattd, of the University of Minnesota, has found.

In a survey just completed Prof. Umstattd found that teaching appointments per institution had decreased from 10.7 in 1920-21 to 6.9 in 1931-32. Appointments in English have exceeded those in every other subject, with education ranking next. Subjects that suffered greatest decreases were agriculture, botany, home economics, engineering, and Romance languages. In the 184 colleges included in the survey no reductions had been made during the depression in deanships of women, registrars, the health service, accounting, astronomy, child welfare, nursing, or military science.

Science News Letter, January 20, 1934

PLANT PATHOLOGY

Rigid "Wick" Carries Water To Potted Plants

A SIMPLE wick-like rod that can be depended on to keep your plants watered with a minimum of attention from yourself is described by Prof. B. E. Livingston of the Johns Hopkins University.

The "wick" consists of an exceedingly fine-grained artificial filtering material which resembles a very porous sandstone. One end extends upward a couple of inches through an opening in the bottom of the vessel containing the growing plant, the other is immersed in a reservoir of water. The wick carries water up into the pot, where the soil tends to settle firmly against its upper end, maintaining a good capillary contact. Plants can be kept growing indefinitely in this way, the only attention necessary being an occasional refilling of the reservoir.

Science News Letter, January 20, 1934

NCE FIELDS

METEOROLOGY

Record "High" Caused Britain's Fine Weather

THE REMARKABLY fine weather which Britain enjoyed during 1933 was due to a record-breaking anticyclone which persistently remained on the Atlantic to the westward of Ireland. At short and more or less regular intervals "tongues of high pressure" spread out from this anticyclone and covered Britain and Western Europe.

This is the explanation of Dr. J. Glasspoole and W. L. Andrew, both of the Climatological Section of the British Meteorological Office. The abnormal summer of 1933 is an excellent illustration of the meteorological maxim that "the present state of the weather always tends to continue."

Science News Letter, January 20, 1934

ASTRONOMY

Star Explosions Thought To Start Cosmic Rays

COSMIC rays originate when a star explodes into a super nova, according to a theory of Drs. F. Zwicky and W. Baade of Pasadena.

A nova is a star which suddenly flares up to many times its normal brightness. Such an event recently happened in the constellation Ophiuchus and has been much discussed. These novae ordinarily become about twenty thousand times as bright as our sun but occasionally they become enormously brighter and then they are termed super novae. Such a one appeared in Andromeda in 1885 and lasted about 25 days, giving off a hundred million times as much visible light as our sun.

A super nova, according to Dr. Zwicky, would give ten million times as much ultraviolet light as visible. That means it would give off as much energy in one second as our sun does in a hundred million years. With this tremendous supply it would not be surprising if a great deal of high energy radiation such as cosmic radiation were included.

This theory therefore indicates that the rays are intermittent since such super novae are rare. Dr. Zwicky estimates about one in a galaxy in a thousand years. This accounts for our failure to get any appreciable cosmic radiation from our own galaxy. It also explains other puzzles which other theories bring up. The main advantage is that the rays come mainly from extremely far distances—from stars beyond the powerful telescopes of the present time.

Dr. Zwicky went on to discuss the remains of such a nova after explosion. He pictured it as a star of neutrons with no ordinary matter. It would be so dense that a ball ten miles in radius would contain all the matter in the sun. The earth's mass would occupy less than a mile in radius. On such a small earth the force of gravity would be four thousand times as great as on our planet.

Scientists are not inclined to accept the theory until it shows its ability to withstand unfriendly criticism.

Science News Letter, January 20, 1934

NUTRITION

Study Fails to Show Why Brain Workers Tire So Easily

CAREFUL study of the energy consumed by persons doing physical and mental work fails to explain why brain workers feel so very tired after prolonged mental effort, Dr. Francis G. Benedict and associates of the Nutrition Laboratory of the Carnegie Institution of Washington have just reported.

"In view of the sense of extreme, almost over-powering fatigue in both mind and body following intellectual activity, it is surprising that brain-work has such an insignificant effect upon the general level of vital activity," is one of the observations in the report.

Brain-workers, contrary to popular opinion, do not need fish or other phosphorus-rich food any more than any other workers, the study showed. In fact, the only extra energy needed for an hour's intense mental effort is contained in half a peanut, in about one-thirtieth of an ounce or sixteen grains of cane sugar, or in about one-eighth of an ounce of the edible part of a banana.

"A housemaid engaged in sweeping and dusting the study of a college professor would expend as much extra caloric energy in three minutes as the professor would expend in excess of his basic needs during an hour of intensive work at his books," Dr. Benedict stated.

Science News Letter, January 20, 1934

GENETICS

Evolutionary Changes Induced By Heat

MUTATIONS, suddenly-appearing marked evolutionary changes, have been induced in the tiny fruit-flies that are favorite subjects for such experimentation by exposing them for short periods to high temperatures. At the meeting of the Genetics Society of America, Prof. Harold H. Plough and Philip T. Ives of Amherst College told of experiments they performed along this line, which confirmed earlier similar work done in Germany by the noted geneticist, Dr. Richard Goldschmidt. Before Dr. Goldschmidt's pioneer research in temperature, the only known way of forcing the slow hand of natural evolution was by means of the X-ray bombardment first used at the University of Texas by Prof. H. J. Muller.

The heat-treated insects used by Prof. Plough and Mr. Ives produced 44 recognizable mutations among the first five generations, as against only three mutations among the untreated "control" groups of flies; but since more heated insects were studied, the actual ratio of mutations was about five to one. Thus a possible mechanism for the production of mutations in nature is suggested, after which the sieve of natural selection can go to work.

Science News Letter, January 20, 1934

AGRICULTURE

China Improves Crops To Avert Famines

CHINA, a country which has had 2,200 famines in 2,000 years, is safe-guarding the future by a project for the improvement and distribution of native grains. As a result of the project over a million and a half pounds of improved seeds have been distributed to Chinese farmers within the last five years.

Varieties of wheat yielding 50 per cent. more than Chinese strains used hitherto have been perfected and varieties of soybeans yielding 45 per cent. more than the best Chinese strains have also been made available. Corresponding increases in cotton, millet, barley, and corn have also resulted from the project, which has been carried on jointly for the past five years by the University of Nanking, the International Education Board and Cornell University.

Science News Letter, January 20, 1934

PUBLIC HEALTH

Japan's New Enemy

Disease-Bearing Rats, Entrenched in Their Strongholds In Manchuria, May Succeed Where China's Armies Failed

By JANE STAFFORD

WILL PLAGUE stop the Japanese from further encroachment into China? Will the Black Death force them to give up all or part of their holdings in their neighbors' territory.

The Chinese could not stop Japan's invasion of their country, but the Black Death may prove a more implacable, devastating foe than regiments of Chinese soldiers.

Epidemics of both bubonic and the even more dreaded pneumonic forms of plague have already attacked districts in the north and west of Manchuria, China's Lost Province.

If plague should succeed in thwarting the Japanese, there will be a sort of poetic justice in the situation, for the disease has reentered China from its haunts in Transbaikalia, a province of Japan's old enemy, the Russians.

Furthermore, the Japanese will have themselves to thank if the Black Death puts a disastrous end to their plans for extension of the empire into China. The present outbreaks of plague in Manchuria are seen by quarantine officers in China and elsewhere as the direct result of Japanese military occupation. This disrupted the highly important work of the Manchurian Plague Prevention Service, practically strangling its activities at Harbin.

The Plague Prevention Hospital at that city had been the main line of defense against plague for both China and the rest of the world. But when the Japanese entered the country, its experienced and eminent director, Dr. Wu Lien-Teh, was obliged to leave. His name was stricken from the list of officers of the hospital, and the institution was put in charge of a junior officer.

The hospital and the Plague Prevention Service had been established after the disastrous epidemic of pneumonic plague in Manchuria and Northern China in 1910 and 1911. At that time 60,000 lives were taken and the monetary loss resulting from the epidemic was estimated at one hundred million dollars. Harbin played an ominous role in the epidemic of that winter, but when plague struck Manchuria again ten years later, it was the Plague Prevention Hospital and Service that played the leading role in stopping the epidemic and preventing it from spreading beyond that point.

The devastation of an invading army pales beside the havoc that follows an extensive outbreak of plague. In England during the Middle Ages the Black Death took from half to two-thirds of the population. In other words, 600 out of every 1,000 persons fell a victim to plague. It is estimated that 20,000 of London's entire population of 40,000 died of plague during the years of the Black Death. Business was dislocated; cattle and sheep were left to wander, for there was no one to care for them; and disease broke out among the beasts also. As half the laborers in the country were dead, wages rose to an unprecedented height.

Devastated Common People

"The distribution of the mortality was various," one historian wrote of the plague in England in the fourteenth century. "Those of high rank were not greatly affected, but of the common people an incalculable number died, and very many of the clergy, nuns and friars. The religious houses seem especially to have been severely visited by the Black Death, and many of them were closed and left deserted. The records of mortality in those days were indifferently kept and it is most difficult to arrive at an estimate of the number who died of the plague. Contemporary writers vary in their estimates from one-fifth to nine-tenths of the total population as the extent of the mortality, but it is probable that between one-half and two-thirds would be a more accurate estimation."

Another authority relates that in India the appalling number of 10,000,000 persons died of plague between the years 1896 and 1917.

If you recall the disastrous influenza epidemic during the World War and the terror that outbreak aroused, you will have a faint picture of what a plague epidemic can mean to a country and its people. The plague that swept the world in the middle of the fourteenth century, described as the worst disaster ever experienced by man, is said to have been three times as severe in actual number of people killed as that frightful influenza epidemic.

Plague is caused by a microbe called *Pasteurella pestis*, seen under the microscope to be a short, thick, rod-shaped bacillus. Here again the international situation injects itself interestingly: The germ that causes the disease now raging around Manchuria, apparently as a result of the Japanese occupation, was discovered by the Japanese scientist, Kitasato, during an outbreak in Hongkong in 1893. Kitasato shares honors as discoverer of the plague bacillus with the French scientist, Yersin. While Kitasato was working in Hongkong, Dr. Yersin, sent from Pasteur's laboratory to investigate a simultaneous outbreak in Cochin-China, also succeeded in finding the causative organism.

But the real villain of plague epidemics is the Big Bad Rat. This animal and his zoological cousins, mice, squirrels, marmots and other rodents, keep the disease alive in between epidemics and help to spread it from one place to another. Fleas living on plague-infected rats give the disease to man when they get a chance to bite him.

A connection between rodents and the Black Death was suspected even in very early times, centuries before man had learned that animals might be reservoirs of human disease or that minute living organisms were the causative agents of the plagues that scourged the world.

Conquered by Great Fire

According to the Bible, the Philistines made offerings of golden images of mice to stay the pestilence that marred the land—a pestilence that was very probably the plague. If they had only known it, burnt offerings of real mice and rats would have been much more effective in ridding the country of plague. The coincidental burning of all rodents in London during the Great Fire of 1666 was what finally rid England of the plague that had harassed it for 300 years.

In the great epidemics of the Middle Ages, various observers noted that rats came from their holes, lost all their fear of man, became uncertain in their

PREHISTORIC MIRROR

A University of Pennsylvania Museum expedition recently returned from Piedras Negras, Quatamala, with fragments of what is said to be the largest hematite mirror ever found by archaeologists. The assembled mirror is displayed in the picture by Miss H. Newell Wardle of the Museum staff. Hematite is a form of iron ore that was put to many uses by primitive people in America.

movements and died in great numbers. Even the most ignorant people came to regard deaths among rats as foretelling the coming of the plague. When they found dead rats in their homes or about the premises they fled, abandoning their homes and seeking refuge in the country, which was generally considered to be healthier.

Poverty, hunger and filth were long known to favor the spread of the disease. Naturally the better constructed and better kept homes of the well-to-do were more apt to be free from rodents and vermin even in early times, although the rich and powerful did not escape the disease during the epidemics of the Middle Ages and earlier periods.

Ignorance and poverty are important factors in keeping the disease alive in China. During hard times and famines the people are obliged to rely for part of their food on hunted wild rodents, particularly the tarabagan or Siberian marmot, a kind of woodchuck. These animals are apt to be infected with plague; and when the famine-stricken population of Manchuria and neighboring Transbaikalia turn to the tarabagan for food, they get the disease.

These animals are valued for their fur as well as for food during hard times. It has long been known that men became infected with a highly fatal disease in skinning the animals. The risk is increased by the fact that the ones that are ill with plague are of course easily captured.

In this region the people live crowded together in small huts during the winter, which favors the spread of the infection. Whole communities are wiped out. Fear drives some of the population to adjacent territory, but unfortunately they carry the disease with them.

Goes From Man to Man

The disease once established in man may be transferred directly from one person to another. This is particularly the case with pneumonic plague, which is the most deadly variety.

Plague occurs in several forms. Bubonic plague is the common variety. Swollen glands or buboes are a characteristic feature which gave this variety its name. Another characteristic is the development of spots on the skin known as "plague spots" or "tokens of the disease." From these spots the disease got its name of Black Death during the Middle Ages. Headache and backache, stiffness of arms and legs, restlessness, great anxiety and depression of the spirits mark the beginning stages of bubonic plague.

This form may also attack the lungs, but true pneumonic plague has a much more sudden onset and the lungs are first involved. Patients rarely recover from this form, generally dying from two to four days after being stricken.

Fighting the plague means fighting rats or whatever rodent is responsible for the disease in the locality where it appears. During an epidemic the campaign is carried on by trapping and poisoning all the rats. All patients, of course, must be isolated. In between epidemics, anti-plague measures consist chiefly in rat-proofing buildings. Dwellings and particularly warehouses and food storage houses must be so built that rats cannot enter them. Plague was formerly carried from one country to another by the rats that lived in the holds of ships and came ashore at ports.

Stopped by Rat-Proofing

When the rat's villainous role was learned, wharves were rat-proofed and smooth metal guards, too wide for a rat to crawl over were fitted onto ships' hawsers. Ships known to have come from plague-infested ports are fumigated by quarantine officers.

Both a vaccine for protection against the plague and a serum for its treatment have been developed, but neither has been very successful. The vaccine gives relative immunity to the disease for about six months.

All these measures for checking plague and preventing its spread are well-known to the Japanese. Plague has broken out in that country and has been eradicated very promptly. Quarantine officials here believe that they will lose no time in taking action against it if it reaches the occupied area. But the fight against plague is very costly and tedious, particularly in such a disorganized and backward region as Manchuria. The Japanese may decide to retreat before this new and implacable foe. The plague-ridden region may not seem worth the struggle and the cost, in men and money, of a mighty battle with the Black Death.

In contrast to the Manchurian picture, plague seems to be on the decline in other parts of the world. The Health Section of the League of Nations reports that during the last two years plague has disappeared from Algeria, Tunis, Tripolitania and Nigeria. There has been a marked decline in Egypt and East Africa, and in Senegal it is limited to Dakar. On the other hand the disease has invaded fresh territory in Southwest Africa and Angola and has increased in Madagascar.

In South America the disease is on the decline in Ecuador and Peru, but fresh small foci have appeared in Bolivia and Argentina.

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SEISMOLOGY

Benares Near Center Of Monday Earthquake

BENARES, sacred city of India, was the nearest large focus of population to the epicenter of the severe earthquake that struck India at 3:43.1 a. m. (Eastern Standard Time) on Monday, Jan. 15, seismologists calculated after examining data wired to Science Service by a dozen earthquake observatories in the United States, Canada and England.

The approximate location of the center of disturbance was 25 degrees north latitude, 84 degrees west longitude.

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ARCHAEOLOGY

Grave of Prehistoric Chief's Daughter Excavated

See Front Cover

A GIRL of twenty, almost toothless! This is the pathetic picture of prehistoric Alaska revealed in the skeleton of an Eskimo chief's daughter.

The grave of the girl, discovered in southwestern Alaska by Dr. Frederica de Laguna of the University of Pennsylvania Museum, yielded the skeleton. An osteologist at the Museum has examined the bones and pronounced the smooth surfaces of the joints typical of a young woman in the early twenties. But at the time of her death, only three or four teeth were in the upper jaw and not many more in the lower jaw. The others had fallen out some time before, leaving her with the shrunken cheeks of an old woman.

The expedition, whose discoveries are now being studied at the Museum, has been conducted jointly with the Danish National Museum represented by Dr. Kaj Birket-Smith.

The chief's daughter was discovered at an old village site near Cordova, Prince William Sound. The grave was just outside a house, Dr. de Laguna explained. The cover picture shows the archaeologists carefully opening it. They found the Eskimo girl on her right side in a wooden coffin rotted to the consistency of wet cardboard. More than 800 beads of shell, ivory, and bone lay between the legs of the skeleton, and are evidently remains of an elaborately decorated apron-like garment. The beads are of a type worn only by the wife or daughter of a chief.

The house site is marked by a few large corner posts and stakes, which the archaeologists dug out. Marks of stone adzes used by the builders can still be made out on the wood.

"Skeletons of three new-born infants, one shoved roughly under a stone, were found," said Dr. de Laguna. "This suggests that infanticide was practised by these Eskimos, as among some Eskimos farther north.

"In a burial cave near the village we found the skeleton of a man, perhaps a chief, with whom had been buried two other individuals who may have been slaves.

"With this man we found some fine objects, including a handful of very long, slender needles, laid across his chest, two adze blades put under his shoulders, two bear teeth and two ivory buckles carved in the shape of bears near his hand, and at his side a bone dagger and long bone bayonette.

"The antiquity of this Eskimo culture is shown by the sinking of the land. the oldest villages are being washed away by the sea. Some are already destroyed."

Assistants on the expedition were Norman Reynolds, anthropology student from the University of Washington, and Wallace de Laguna.

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PHYSICS

Neutron Study Leads to New Cosmic Ray Theory

THE most important constant in the theory of the nucleus, namely the mass of the neutron, can now be determined with greater precision than before, and its value is 1.0062. This conclusion has been reported to the American Physical Society by Dr. R. M. Langer of the California Institute of Technology. The calculations are based on disintegration experiments in Lord Rutherford's laboratory in Cambridge, England.

The mass 1.0062, which is somewhat lower than is generally accepted, has some remarkable implications. It means that the deuton can be split up into a proton and a neutron with comparatively little effort. It means that a proton can be split into a neutron and a positive electron even more easily. It means that two neutrons might join together into a stable molecule. But all these and other conclusions will be very much strengthened if the precision of the value 1.0062 is slightly increased.

Dr. Langer explains that the constituents of the atomic nucleus join together as though they were little magnets. The groups might be magnets or not according to the number of constituents. The groups might also spin like tops and this property could also be deduced from the number of neutrons and protons. The famous Pauli principle is invoked in this matter and seems always to give results in agreement with experiments. The principle states that a group of particles never forms a whole but each particle retains its individuality. This simple and remarkable statement has cleared up a great deal of the science of chemistry and now promises to elucidate some of the mysteries of the nucleus.

Dr. Langer presented a new theory of the cosmic rays. He begins with the assumption that a proton in the nucleus may sometimes lose its electrical charge. This happens so rarely that the proton can on the average expect to live over a million, million, million years. But still there is always enough shortage of positive charges in our galaxy to attract roaming positives from outside. Some of course reach our earth. Their velocity is high enough to permit them to penetrate our atmosphere. They would show a change with latitude and direction exactly as observed.

The excess of negatives on the earth would also try to escape just as they are found to do in the currents of atmospheric electricity. Other terrestrial and cosmic phenomena find explanation along the same lines.

Previous theories have misled people, in Dr. Langer's opinion, into conclusions about the amount and character of cosmic ray energy in space. Apparently the energy is rather local. Other galaxies may also have cosmic rays in them but if their electrons are positive their cosmic ray charged particles will be negative. According to Dr. Langer's theory there will be very few energetic rays in intergalactic space. He claims that while other theories were constantly losing in experimental support, his is constantly gaining.

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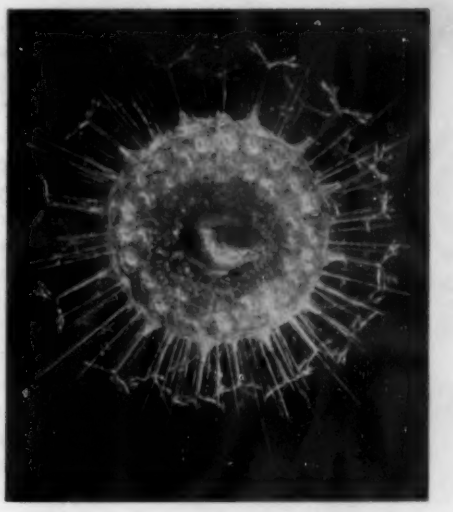
PHYSICS

Energy Turned Into Matter When Electron Divides

NOT ONLY cosmic and gamma rays but also fast electrons may give rise to pairs of negative and positive particles when they hit the heart of an atom. This new discovery is mentioned by Dr. D. Skobeltzyn of the Leningrad Physical Technical Institute in a communication to *Nature*.

The Soviet physicist has made stereoscopic photographs of the tracks which these electrical particles make when under the influence of (*Turn to Page* 46)

Name it—→



Here is an intellectual game your friends will enjoy. Any number can play—as many as ten or more, as few as two. People who like to use their heads will find it interesting and stimulating.

The game requires a set of ten striking science pictures. The object is to write the most accurate, most amusing, most curiosity-arousing, or most clever title.

How to Play

Let us say you have six guests. Select six pictures from your set, and give one of the pictures, face down, to each guest. Then pass paper and pencils. Announce that you will allow one minute for each person to write the number of his picture and a good title that will show that he (or she) knows what the picture is. Or make the purpose: (1) Most amusing title; or (2) Most curiosity-arousing title; or (3) Most clever title.

Keep time with a watch having a second hand. Allow no one to work overtime. Quick judgments will result in more fun-provoking answers.

Keep the six pictures rotating until each person has guessed at all of them. Then have each one read aloud his titles. The one with the greatest number of *best* titles wins.

How to Get the Pictures

Fill in and mail, with 30 cents in stamps or coins, the coupon below, and we will send you two copies of SCIENCEPICTURES, the new book containing forty-five photographic reproductions, each the size of SCIENCE NEWS LETTER's front cover picture.

There is an unusual title under each picture. Opposite each there is a clear, brief description of the subject matter of the picture, for your use in judging titles.

How to Make the Game

Clip from one book the pictures you want to use and paste them on cards for your game. Keep the other book for reference. We suggest that you use the following titles from the book, as a starter:

"Like a Jewel from Fairyland"
"Spiny Sculpin Uses Chinese Camouflage"
"Not a Fairy's Furry Opera Cloak"
"New Atom Smashing Machine"
"Young Gargoyle Out for a Walk"
"Wind Blown Lightning"
"55 Ton 'Top' to make Ship Ride Smoothly"
"Myriads of Sisters, but No Twin"
"She-Wolf Guards Her Young"
"In the Form of a Dove"

When you have pasted these pictures on stiff paper or cardboard, number the cards in order, from one to ten. Now you are ready to start playing this new game for people interested in science and in scientific oddities—this game for people who like to use their heads.

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For the enclosed 30 cents please send me two 25-cent copies of the new book, SCIENCEPICTURES.

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a strong magnet, which turns the moving positive and negative particles in opposite directions.

In one pair of photographs, the nearly straight original track of a fast moving electron is seen to give rise to two oppositely curved tracks. The velocity of the particle causing the track may be estimated from the curvature of the path, the slower the movement the greater being the curvature. Thus it can be calculated that the formation of positive and negative electrons in the above mentioned instance was accompanied by a loss of energy equal to their mass multiplied by the square of the velocity of light—just as is the case when cosmic and gamma rays are changed into matter.

The fundamental law of the transformation of energy into matter seems therefore to have been exemplified for a second time, in a different manner.

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From Page 35

interest on his debts, and the science investment is less than 36 per cent. of the increase of next year's interest over this year's.

This small fraction of the federal expenditure that is being spent for scientific research will pay into the purses of the public, in savings, better living and increased earnings, dividends of thousands per cent. in the coming years. Some of the most outstanding industrial developments of today had their roots in Uncle Sam's delving into science in past years and the contributions made to human health and happiness, not always to be evaluated in dollars and cent. are legion.

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PHYSICS

Advanced Physics Theory Lags Behind Experimentation

THE MOST highly developed parts of that highly developed field of the new physics, quantum mechanics, are not good enough to predict the results of clever experimenters. The Zeeman effect, which describes the behavior of an atom in a magnetic field, and the light given out by the hydrogen atom are the subjects under fire.

So complacent is the physicist about these matters that the discrepancies would not be believed were they not put forward by the highest authority in the field. Prof. V. W. Houston, who has announced these results obtained at the California Institute of Technology with the collaboration of Prof. Y. M. Hsieh of Yenching University in China and L. E. Kinsler, a graduate student, is known to have done the best experimental work in both these fields. He is at the same time one of the country's foremost theoretical physicists so that his interpretations must be considered as quite reliable.

Prof. Houston had worked up a method based on the supposedly sound theory of the Zeeman effect for measuring the specific charge of an electron. His results were accepted and revised all previous work. Now with Mr. Kinsler he has found that in the simplest and apparently surest case, namely that of helium, the specific charge seems to come out wrong. Any physicist would have bet a hundred to one against this result.

In the other experiments with Prof. Hsieh on the fine structure of the hydrogen spectrum the results are startlingly different from the predictions of the equation of Prof. P. A. M. Dirac, British physicist. This equation represents the pinnacle of achievement in theoretical physics and was the main contribution of Prof. Dirac, who recently was awarded the Nobel Prize. But Profs. Houston and Hsieh show that even this equation is not good enough for exact work.

The difficulty with the theory seems to be that it treats the atom as if it were alone in space. Actually it is connected with its surroundings through electromagnetic fields. In other words it is part of the whole universe. How to take this interaction into account is likely to prove a highly difficult problem.

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PSYCHOLOGY

Stuttering Children Found to be Talkative

CHILDREN who stutter are more talkative, and use more words when they talk, than do children in an "average" group, Dr. H. Meltzer of the St. Louis Psychological Service Center has discovered. He applied the same test, consisting of the imaginative identification of the shapes of a number of ink blots, to fifty child stutterers and an equal number of children of the same ages taken from the general population.

The small stutterers were found to be nearly forty per cent. more talkative than the "control" group, that they averaged 200 words apiece as against 135 for the other children, and that they responded to the question "What could that be?" quite as quickly as did those without speech impediments.

"If the number of words used in the total time taken is considered as an index of rate of talkativeness, the mean rate for stuttering children is 51.08 per cent. greater than it is for the control group," Dr. Meltzer commented.

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NATURE RAMBLINGS by Frank Thone

ZOOLOGY

Rikki-Tikki-Tavi

KIPLING celebrated a friend of his, a mongoose named Rikki-Tikki-Tavi, an active, restless, rather quarrelsome little fellow who ruled the house and kept it free of rats and snakes. This relative of the weasel is a much-appreciated house animal in India and elsewhere in the East, where he performs the functions assumed with us by the cat. Only Tabby doesn't undertake snakes, which are said to be Rikki's favorite dish. He has the further advantage of being able to follow his vermin prey into many cracks and holes where the wider-bodied cat could not squeeze herself.

But if he has more than the household virtues of a cat, Rikki also has more than her vices. He was transplanted to the West Indies many years ago, and like most immigrants who take hold at all he has thriven better in his new home than in his old. There he has developed into an inveterate chicken-thief and bird killer; so much so that in parts of the island he threatens to wipe out the native bird population.

Under his more classical name of ichneumon, Rikki was known to the Greeks and Romans, at least to such of them as travelled in Egypt. They propagated the story about him, that he kept down the crocodile population, in spite of his diminutive size, by the simple expedient of finding their eggs in the sand and eating them. Modern zoologists disagree on this point.

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Wall paintings showing ancient Mound Builder Indians in full regalia and color are installed in the Archaeological Museum at Phillips Academy, Andover, Mass.

ENTOMOLOGY

Corn Acreage Reduction May Reduce Pests

REDUCING corn acreage in accordance with the program of the Department of Agriculture may bring the farmer indirect benefits in addition to the promised Government pay-check. He stands to get rid of at least a part of the insect pests that prey on the roots of his corn. How this may come about is explained by J. H. Bigger of the Illinois Natural History Survey.

In ordinary farm practice in the Corn Belt, corn is planted two or more years in succession in the same fields, and then other crops, especially clover, alfalfa or other legumes, are introduced into the rotation program. The succession of corn immediately after corn gives the insect enemies that are left in the soil from the previous year's crop altogether too good feeding, until the introduction of a crop whose roots they cannot eat checks their multiplication.

In several rotation experiments described by Mr. Bigger, it was demonstrated that long successions of corn encouraged root-feeding insects, while short successions kept their numbers under control. He feels that when the farmer is pledged to produce less corn he will give a more prominent place in his rotation schedule to legume crops, thereby cheating his enemies out of their accustomed easy feeding.

A further advantage that will accrue to the farmer is the smaller quantity of seed he will need when he does plant corn. When an insect-infested field is planted, a certain excess of seed has to be put into the ground, to allow for the killing that the enemy insects can be counted on to do. This extra seed of course costs extra money. If he does not need to pay this tribute to the insect pests the farmer can keep this money in his pocket.

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First Glances at New Books

Additional Reviews On Page 48

Astronomy

SUNS AND WORLDS—W. H. Steavenson—*Black*, 104 p., $1. This is an excellent little introduction to astronomy, an addition to the How-&-Why Series edited by Gerald Bullett. Dr. Steavenson, a medalist of the Royal Astronomical Society and past president of the British Association, tells his story in a simple, straightforward style that might well be emulated by other scientists writing for popular consumption.

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Education

YEAR-BOOK OF THE NEW YORK INSTITUTE FOR THE EDUCATION OF THE BLIND, 1933, 51 p., free. This year-book should find a wider circle of readers than year-books and annual reports usually get. The Century of Progress in the education of the blind which it pictures, both verbally and photographically, will probably be an eye-opener to many of the seeing public who have not yet learned, for instance, that all games, track meets and dancing classes are part of the regular activities at schools for the blind as well as at schools for the seeing.

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Ethnology-Technology

NAVAHO WEAVING—Charles Avery Amsden—*Fine Arts Press*, 261 p., 123 pl., $7.50. A very fine book, covering the subject of Navaho weaving technic, dyes, and the uses of Navaho textiles, and following with a history of Navaho weaving from "the first sheep" down to a prediction of what the future holds for the Indian weavers. The illustrations, many in color, include photographs of more than a hundred old, authentically dated blankets. While a specialized subject can rarely hope for a wide circle of general readers, this book is sufficiently attractive, so that any one who has ever taken a second look at an Indian blanket would find much of interest inside the very decorative covers.

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Paleontology

A POPULAR GUIDE TO THE NATURE AND THE ENVIRONMENT OF THE FOSSIL VERTEBRATES OF NEW YORK—Roy L. Moodie—*Univ. of the State of New York*, 122 p., 49 illustrations, 45c. This appears as New York State Museum Handbook No. 12.

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First Glances at New Books

Additional Reviews On Page 47

History of Science

A HISTORY OF DARWIN'S PARISH, DOWN, KENT—O. J. R. and Eleanor K. Howarth—*Russell & Co., Southampton,* viii+88 p., 1s. 6d. Charles Darwin was the grandson of a scholarly Church of England clergyman and he lived most of his life in the quiet parish where he was born. We are all of us more or less influenced by our environment, so that it is of more than ordinary interest to have access to the environmental background of this man who changed much of the world's course of thought and action. The Howarths tell their tale appropriately: with a quiet decency and occasional touches of quiet humor.

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Seismology

EARTHQUAKE RISKS IN ARKANSAS—George C. Branner and J. M. Hansell—*Arkansas Geological Survey,* 13 p., 3 plates, 60c. Arkansas shared prominently in the famous New Madrid earthquake of 1811, which re-made a great deal of the bottom lands along the Mississippi and its southern tributaries. There have also been many lesser shocks during the state's recorded history, so that although it is not commonly thought of as "earthquake country" it is nevertheless actually a seismic region of some importance. This compact study will therefore be valuable to geologists, engineers and the scientific public generally. This appears as Information Circ. No. 4.

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Radio

WIRELESS OVER 30 YEARS—R. N. Vyvyan—*George Routledge & Sons, London,* 256 p., 8s 6d. A history of wireless from its early days down to the present.

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Education

THE SMALLER SECONDARY SCHOOLS—E. N. Ferriss, W. H. Gaumnitz, and P. R. Brammell—*U. S. Govt. Print. Off.,* 236 p., 15c. Monograph No. 6 of the National Survey of Secondary Education.

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General Science

SCIENCE IN THE ELEMENTARY SCHOOL—*Maryland State Dept. of Education,* 331 p., 50c. Material and suggestions for six units of study in each of the seven elementary grades are provided by this Bulletin prepared by Miss I. Jewell Simpson. This is a part of the laudable effort on the part of those in charge of our school system to enlarge and make more useful science teaching in the graded schools.

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Technology-Economics

THE MACHINE UNCHAINED — Leo Hausleiter—*Appleton-Century,* 376 p., $3. A German engineer-economist with a somewhat different viewpoint from those in this country who have written upon the impact of technology upon our civilization, discusses the revolution in the world economic system from the first steam engine to our present crisis of plenty. The dominating thought: "The mechanization of the world mechanized man, mechanized the spirit. Machinery assumed mass forms. The tempestuous liberation of productive forces shook all that was firmly rooted in the earth. Man turned to a machine (he works like a machine) and the machine turned human (it works like a human being) and they came to follow the same path, chained to one another by impersonal thought in terms of money."

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Research

MANUAL ON RESEARCH AND REPORTS—Amos Tuck School of Administration and Finance, Dartmouth College—*Williams & Wilkins,* 108 p., $1.25. The manual has special application to investigations in the field of business, economics and public affairs. Second printing.

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Standards

INDEX TO A. S. T. M. STANDARDS AND TENTATIVE STANDARDS—*American Society for Testing Materials,* 124 p., free. The index, issued annually, is a valuable reference in which may be located bound A. S. T. M. publications concerning specifications, methods of testing, recommended practices and definitions on engineering subjects.

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Physics-Engineering

GYROSCOPIC STABILIZATION OF LAND VEHICLES—J. F. S. Ross—*Longmans, Green,* 172 p., $5.25. This is an inquiry into whether monorail traction is scientifically sound and definitely practicable. Dr. Ross concludes that it is and that if once the arduous and extensive stage of experiment is successfully surmounted, we may look back upon double-rail traction as antiquated and clumsy. The book contains a comprehensive descriptive, mathematical and historical treatment of the problem.

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Education

A CENTURY OF PROGRESS EXPOSITION, CHICAGO 1933—*Reuben H. Donnelley Corp.,* $5. A beautiful picture book which portrays in well-reproduced photographs and color plates the Century of Progress Exposition. Scientists will be particularly interested in the illustrations of the scientific exhibits in the Hall of Science and in commercial displays.

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Forest Ecology

POST-LOGGING DECADENCE IN NORTHERN HARDWOODS—Ralph C. Hall—*Univ. of Mich. Press,* 66 p., 25c. Regression in vegetation of cut-over land is traced to unfavorable changes in the physical environmental factors, rather than to the rise of biotic enemies at first suspected.

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Engineering-Sociology

THE ANTI-SLUM CAMPAIGN—Sir E. D. Simon—*Longmans, Green and Co., London,* 206 p., 2s 6d. A British engineer, former mayor of Manchester and parliamentary secretary to the Ministry of Health, surveys the problem of providing adequate housing in his country.

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Bacteriology

BACTERIOLOGY AND SANITARY SCIENCE—Louis Gershenfeld — *Lea and Febiger,* 493 p., $4.50. Second edition, thoroughly revised, of a comprehensive textbook for students in pharmacy, chemistry and allied sciences.

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